

# CLAIMS

1. An array antenna base station apparatus comprising:  
an array antenna made up of a plurality of antenna  
elements;

5 a directivity generator that generates transmission  
directivity of a general communication terminal apparatus  
that carries out communication at a speed equal to or  
lower than a second information transmission speed in  
such a way that a null is directed in the direction of  
10 arrival of a signal sent from a high-speed communication  
terminal apparatus that carries out communication at a  
speed equal to or greater than a first information  
transmission speed; and

a transmitter that sends a signal from said array  
15 antenna to the general communication terminal apparatus  
using the generated transmission directivity.

2. The array antenna base station apparatus according  
to claim 1, said directivity generator comprising:

20 a directivity candidate generator that generates  
a transmission directivity candidate for the general  
communication terminal apparatus in such a way that a  
beam is directed in the direction of arrival of the signal  
sent from the general communication terminal apparatus;  
25 and

a shifter that shifts the transmission directivity  
candidate in such a way that the null of the generated

transmission directivity candidate almost matches the direction of arrival of the signal sent from the high-speed communication terminal apparatus, wherein the shifted transmission directivity candidate is regarded as the transmission directivity of the general communication terminal apparatus.

3. The array antenna base station apparatus according to claim 2, further comprising a calculator that calculates a difference between the direction of arrival of the signal sent from the general communication terminal apparatus and the direction of arrival of the signal sent from the high-speed communication terminal apparatus, wherein said shifter shifts the transmission directivity candidate only for a general communication terminal apparatus whose calculated difference is equal to or lower than a threshold.

4. The array antenna base station apparatus according to claim 1, wherein said directivity generator generates transmission directivity for the high-speed communication terminal apparatus in association with the number or density of high-speed communication terminal apparatuses and said transmitter sends a signal to the high-speed communication terminal apparatus using the generated transmission directivity.

5. The array antenna base station apparatus according to claim 1, further comprising an interference detector that detects the amount of interference with the high-speed communication terminal apparatus, wherein  
 5 said transmitter sends a signal to the high-speed communication terminal apparatus using adaptive modulation set in association with the detected amount of interference.

10 6. The array antenna base station apparatus according to claim 1, further comprising a power estimator that estimates power of the signal sent to the general communication terminal apparatus, in the direction of arrival of the signal sent from the general communication  
 15 terminal apparatus, using the transmission directivity of the general communication terminal apparatus generated by said directivity generator, wherein said transmitter sends a signal with transmit power which is set in association with the estimated power to the general  
 20 communication terminal apparatus.

7. The array antenna base station apparatus according to claim 1, wherein said directivity generator generates the transmission directivity of the general communication  
 25 terminal apparatus in such a way that a null is directed in the direction of arrival of a signal sent from a high-speed communication terminal apparatus to which a

communication is planned to be carried out in the next time slot.

8. The array antenna base station apparatus according  
5 to claim 1, further comprising a determinator that  
determines a group to which communication terminal  
apparatuses belong in association with the directions  
of arrival of signals sent from the communication terminal  
apparatuses, wherein said transmitter sends signals at  
10 a speed equal to or greater than the first information  
transmission speed to communication terminal apparatuses  
that belong to a same group.

9. The array antenna base station apparatus according  
15 to claim 1, further comprising a recognizer that  
recognizes a change in the amount of interference at a  
communication terminal apparatus, wherein said  
transmitter sends a signal at a speed equal to or greater  
than the first information transmission speed to the  
20 communication terminal apparatus in association with the  
recognized change in the amount of interference.

10. The array antenna base station apparatus according to claim 1, wherein said directivity generator changes the width of a null to be directed in the direction of arrival of the signal sent from the high-speed communication terminal apparatus according to the

accuracy of estimation of direction of arrival of the signal sent from the high-speed communication terminal apparatus.

5 11. The array antenna base station apparatus according to claim 1, further comprising an estimator that estimates the amount of interference with the high-speed communication terminal apparatus from the signal to the general communication terminal apparatus, wherein said  
10 directivity generator generates transmission directivity in such a way that a null is directed in the direction of arrival of the signal sent from the high-speed communication terminal apparatus for only a general communication terminal apparatus whose estimated amount  
15 of interference exceeds a threshold.

12. A radio transmission method comprising:  
a directivity generating step of generating transmission directivity of a general communication  
20 terminal apparatus that carries out communication at a speed equal to or lower than a second information transmission speed in such a way that a null is directed in the direction of arrival of a signal sent from a high-speed communication terminal apparatus that carries  
25 out communication at a speed equal to or greater than a first information transmission speed; and  
a transmitting step of transmitting a signal from

